

Jirachaya Boonyarit 2014: *Lentinus polychrous* Lev. Grown on the Lower Part of Cassava Stems for the Decolourisation of Aqueous Solutions of Dyes. Master of Science (Biotechnology), Major Field: Biotechnology, Department of Biotechnology. Thesis Advisor: Assistant Professor Nuttakan Nitayapat, Ph.D. 130 pages.

The lower part of cassava stems is an agricultural waste which is discarded in large amount each year. As the major components of the waste are lignin and lignocellulose, the cultivation of *Lentinus polychrous* Lev., a local mushroom variety, on the lower part of cassava stems and utilization of the fungus for the decolorisation of dyes were studied. This study includes the determination of optimum conditions for the cultivation of *L. polychrous* Lev. and factors affecting the decolourisation of dye solutions by *L. polychrous* Lev. grown on this solid material. Box-Behnken Design was used to devise the experiments to determine the optimum conditions for cultivation. It was found that pieces of the lower part of cassava stems of 0.85 – 1.88 mm in diameter containing 50 - 70% initial moisture content and an incubation temperature of 34.1°C - 37°C were optimal for the growth of *L. polychrous* Lev. The initial moisture content of the lower part of the stems was the only significant factor that influenced fungal growth. Among the three fungal ligninolytic enzymes examined, only the activity of laccase was found in crude extracts of the culture. The highest enzyme activity observed using McIlvaine buffer was noted at 50°C and pH 3; however, the lowest stability of laccase was observed at this pH.

The extents of decolourisation of aqueous solution of Novacron Blue, Navy Blue and Telon Blue were influenced by the initial moisture content of the lower part of cassava stems used for the cultivation of the fungus. The most extensive decolourisation of all the dye solutions was observed when the initial moisture content was 70%. Concentrations of Novacron Blue and Telon Blue as high as 500 mg/L did not affect the extent of decolourisation. Similar extents of decolourisation of the dye solutions were observed at incubation temperatures of 30°C, 37°C and 45°C. The higher the pH of solutions of Novacron Blue and Telon Blue, the lower extent of decolourisation. This effect appears to be caused by decreased laccase activity at increased pH. However, this effect was not observed when solutions of Navy Blue were decolorised. Laccase was inhibited by the buffer used and the molecule of Navy Blue seemed to be resistant to degradation. However, it was observed that pH influenced the extent of adsorption of this dye onto the solid growth medium. The dye was adsorbed most extensively at pH 3 and 7 and only a small amount was adsorbed at pH 5. The highest extent of decolourisation of the aqueous solutions of dyes used in this study was greater than 77%. Consequently, *L. polychrous* Lev. grown on the lower part of cassava stems has the potential of being applied to the decolourisation of waste water from textile industries.

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